

Bioengineering Research Partnership (BRP) 1 R24 HL64395

“Bioengineering design of artificial blood”

Prof. Vladimir Torchilin, Northeastern University, Boston

Dept. of Pharmacological Sciences

Chemistry, product formulation, biodistribution

Dr. Robert W. Winslow, Sangart Inc., La Jolla

Large animals studies, pilot plant production, clinical studies

Dr. John A. Frangos, La Jolla Bioengineering Institute, La Jolla

Endothelial cell mechano transduction

Prof. Marcos Intaglietta, UCSD, La Jolla

Department of Bioengineering

Microvascular properties, product design, program direction

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Product defined:

Polyethylene glycol modified molecular hemoglobin oxygen transporter designed to preserve microvascular function. High viscosity, oncotic pressure and oxygen affinity.

Design targets reached:

Microvascular efficacy: Better than blood in resuscitation.

Resuscitation with MalPEG-Hemoglobin improves microcirculatory blood flow and tissue oxygenation after hemorrhagic shock in awake hamster. Wettstein, R., Tsai, A.G., Erni, D., Winslow, R.M. and M. Intaglietta. *Critical Care Medicine* 31:1824-1830, 2003.

Status:

Phase I clinical trials completed at the Karolinska, Stockholm.

Phase II clinical trials started

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New goals:

Definition of mechano transduction properties of the circulation with altered blood composition. Measurement of NO.

New products:

Increased oxygen capacity leading to improved tissue pO_2 , in order to avoid ROS formation. PEG conjugation of polymerized hemoglobin.
Lower cost, by decreasing amount of PEG.

New applications:

Treatment of ischemic tissue via improved functional capillary density and oxygen